

XV.—*On the supposed Gular Pouch of the Male Bustard* (*Otis tarda*, Linn.). By ALFRED NEWTON, M.A., F.L.S.

AN article by Dr. Gloger, of Berlin, lately published in the 'Journal für Ornithologie,' and alluded to by the Editor in the last Number of this Magazine ('Ibis,' 1862, p. 83), has prompted me to transmit a reply to the attack made by that talented writer on "three English anatomists and naturalists." The reason why I have felt myself bound to answer the charges thus adduced by Dr. Gloger is not only that the subject of his paper is one in which I have for some time past been peculiarly interested, but also that, of the three gentlemen whom he especially selects to hold up to ridicule, two have passed away from this world, and these two I had the honour to count among my earliest ornithological friends. On behalf of the third I have not attempted to speak. The situation Professor Owen holds in the scientific world is, by his assailant's own admission, so lofty, that nothing Dr. Gloger says by way of detraction, or that I could allege by way of defence, would in the least affect it.

Having then, with the kind assistance of my friend Dr. Hartlaub, done what I could to repel the virulent and uncalled-for invective of Dr. Gloger upon the late Mr. Yarrell and the late Mr. Mitchell, I shall not here say more about it, for I desire to allay bitter feelings rather than to excite them. But I consider the question of the existence or non-existence of a gular pouch in the male Bustard one of a nature so curious, that I do not scruple to cite somewhat fully the singularly conflicting evidence on the subject, as given by various observers, believing that the readers of 'The Ibis' cannot fail to be interested in it.

According to Schneider (*Reliqua Librorum Friderici II. Imperatoris*, &c., Lipsiæ, 1788, i. p. 34), the Emperor Friedrich II. noticed the "grossum collum" possessed by both sexes of the Great Bustard, and especially by the males "tempore coitûs," as did also, in 1681, Sir Thomas Browne. This learned man, whose knowledge of natural history was so far beyond that of his contemporaries, further remarks (*Works*, Wilkins' edition, i. p. 311) that, "as a Turkey hath an odde large substance without, so had this [*Otis tarda*] within the inside of the skinne." Towards the end of the seventeenth century, six examples of the Great Bustard,

all of them males, were dissected by order of the French Academy of Sciences. Perrault, the examiner, makes no mention of the existence of a gular pouch in any of them ; and his general observations, which are given in minute detail (Mém. de l'Acad. Roy. des Sciences, tom. iii. 2de partie, pp. 99–109), fully accord, as Mr. Yarrell has rightly said, with what has since been noticed of the structure of the species. In 1688 (new style), a paper by Dr. Allen Moulen, containing some “Anatomical Observations in the Heads of Fowl,” was communicated to the Royal Society of London. Among the species examined were Bustards (Phil. Trans. xvii. p. 714) ; but nothing like a gular pouch is described as having been found.

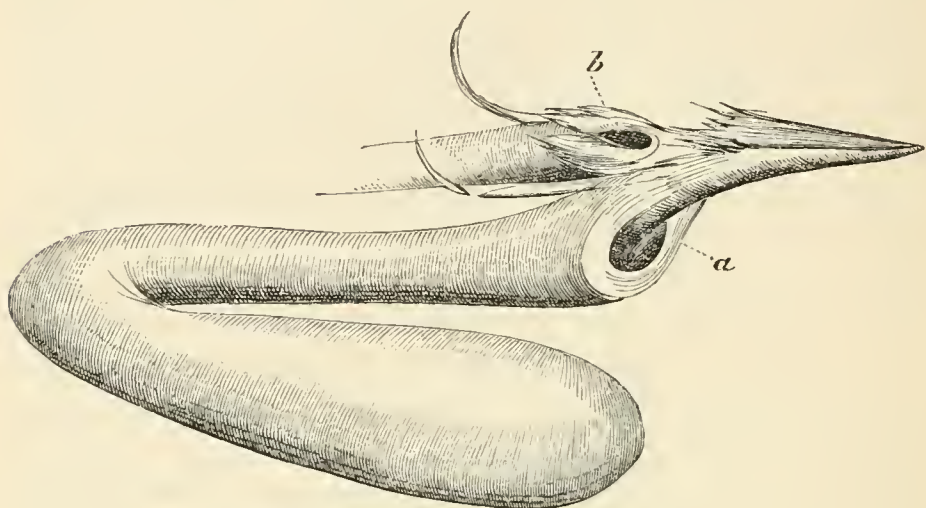
It is beyond all doubt that our knowledge of the supposed gular pouch in the *Otis tarda* is due to a British anatomist—Dr. James Douglas—whom Haller (Biblioth. Anatom. ii. p. 31) designates as “vir eruditus et solers, diligentissimus incisior ;” and the first mention of the discovery known to me (for Douglas, it seems, did not live to announce it himself) was made in 1740, by Albin (Nat. Hist. B. iii. p. 36), in the following vague terms : “Dr. Douglas has observed in the Male [of the Great Bustard] two Stomachs, one for the Food and the other a Reservatory for Water to supply them, they feeding on dry Heaths remote from Ponds and Rivers.” In 1747, a fuller account and also a figure* of the organ were given by Edwards (Nat. Hist. B. ii. tab. 73). Writing of *Otis tarda*, he states, “But what is most surprizing in this Bird was first discovered by the late James Douglass, M.D., Fellow of the College of Physicians ; it is a Pouch or Bag to hold fresh Water, which supplies the Bird in dry Places when distant from Waters ; This Bag is represented blown up by the letter A. I poured into it, before the Head was taken off, full seven Wine Pints (which about equals seven Pounds of our common Weight) before it run over. B. shows the Wind-pipe. C. the Throat or common Passage of the Food. This Bag is wanting in the Hen.”

* I have not thought it necessary to introduce here a copy of this figure, as it has been so often repeated in other works, many of them easily accessible ; for instance, Daniell's ‘Rural Sports,’ Bishop Stanley's ‘Familiar History of Birds,’ besides Bewick's and both the first and second editions of Yarrell's ‘British Birds.’

A few years afterwards, in 1753, this account was almost literally translated and the figure copied by Seeligmann (*Sammlung verschiedener Vögel*, iii. tab. 41), but without mention of Edwards's name, and thus made known to German ornithologists. There is no need for me to quote the passage here. The next author who alludes to the subject is Pallas in his *Journal*, under date of May 28–31, 1772. At this moment I can only refer to the passage in the French translation by Mons. Gauthier de la Peyronie (*Voyages de Pallas*, iv. p. 309), which, though not very accurate in some places, is sufficiently so here. Of the Great Bustard it is said, that “Cet animal a un petit trou sous la langue, qui sert d’ouverture à une bourse aqueuse, qui est de la grosseur d’un œuf d’oie.” Though I cannot doubt that Pallas was aware of what had been published in England, and republished in Germany, this statement has the appearance of being, and in all probability was, founded on his own independent observation. In 1781, Daines Barrington (*Miscellanies*, p. 553) speaks of the discovery of Douglas, stating that Sir Ashton Lever had failed to find the pouch in a female bird; and adding that “a gentleman long resident at Morocco, where they frequently fly their hawks at bustards, hath also informed me that the cock makes use of this reservoir of liquor against these assailants, and commonly thus baffles them.” In illustration of the statement last mentioned, I may refer to the account furnished by Mr. Tristram to the first volume of this Magazine (*‘Ibis,’* 1859, p. 285), and perhaps also to a remark of Dr. Weissenborn (*Mag. N. H.*, new series, 1838, ii. p. 243).

Several years ago, from a note in one of Bechstein's works (*Gemeinnützig Naturgeschichte Deutschlands*, &c., p. 1434), I became aware of a paper by Bloch on this subject; and though I suspected it would prove important, it is only lately, and that through the kind intervention of Dr. Albert Günther, that I have obtained a sight of it, and learned its true value. I do not think I exaggerate this in saying that it affords the strongest evidence in favour of the existence of the supposed gular pouch that I have met with. In 1782, then, Bloch published an account of the disputed structure, accompanied by a plate, in which the opening under the tongue is most distinctly represented

(Schriften der Berlinischen Gesellschaft naturforschender Freunde, iii. pp. 376-7, tab. 8). I here insert a reduced copy of the figure, and I must quote from the article at some length :



“Bey diesem grossem Vogel *** siehet man einen Sack unter der Haut am Halse, dessen Oefnung unter der Zunge sichtbar ist (fig. 7 a) [*Sic in origine, sed potiùs ‘fig. 2 a’*]. Er ist weit, war bey einem alten Hahn, den ich untersuchte ein Fusslang, und erstreckte sich von der Kehle bis an die Brust.

“In den pariser Denkschriften [*ut supra citatum*] treffen wir zwar eine umständliche Zergliederung dieses Vogels an ; es ist jedoch darin dieses Sacks nicht erwähnt worden. Albin gedenkt seiner zuerst, allein, wie Catesby [*hic et infra pro ‘Edwards’ errore captus*] behauptet, so hat man dem Dr. Douglas diese Entdeckung zu verdanken (*Seligmann’s Vögel*, 3 Thl. t. 41). Wenn jedoch Catesby anführt, dass nur die Männchen allein mit diesem Sack versehen wären (*a. a. O.*), so widerspricht diesem meine Erfahrung ; denn ich habe ihn auch bey einem Weibchen gefunden. Auch Herr Professor Pallas hat diesen Sack bemerkt (*dessen Reise*, 3 Thl. S. 220) ; wenn jedoch dieser genaue Beobachter sagt, dass er nur die Grösse eines guten Gänse eyes gehabt habe, so ist derselbe wahrscheinlich von einem jungen Vogel gewesen.”

The author then proceeds to offer some considerations, which I need not extract here, on the probable use of this singular

organ. What is most remarkable in the above is his statement that he had found it also present "in a female." Now there is a kind of witness well known to lawyers as one who tries to prove too much. In such a light Bloch seems to have been regarded by Schneider, who, in 1788, edited the Imperial work on Falcory, to which I before alluded. Here he (*op. cit.* ii. p. 9) observes, "Saccum gularem primus annotavit et pinxit in Otide vulgari Edwards Britannus; eundem deinde in mare vidit aquæque recipiendæ dicavit Cl. Pallas Itinerarii Russici t. iii. p. 220. Sed nuper demum exstitit vir doctus, El. Bloch, qui feminae otidi eundem saccum communem assereret, in Scriptis Societ. Berolin. Amicorum Naturæ Curios. vol. iii. p. 376. Doleo me nondum potiri potuisse hac ave satis in his regionibus frequenti, sed captu difficili, quo ipse oculis meis de dubitatione hac virorum doctorum decernerem. Si mas solus sacco gulari gaudet, potest tum in amore eum forte inflare, ut collum intumescat. Contra si femina eundem habet, quod vix credo, alium tum eidem usum excogitare debemus." I can only stop to record my admiration of Schneider's cautious language. Between 1799 and 1805, Cuvier (*Leçons d'Anatomie Comparée*, publiées par Duméril), as quoted by Mr. Yarrell, dwelt at some length on the blood-vessels, glands, and cellular tissue of the neck in birds, but he does not refer to any peculiarity in the neck of the Bustard. In 1802, Montagu (*Orn. Dict.*, *pagg. innumm.*) states that a preparation of the pouch "may be seen in Sir Ashton Lever's Museum." This celebrated collection was afterwards dispersed by sale, and I have never been able to ascertain what became of the specimen. It seems to me not at all impossible that it may have been the original preparation of Douglas, and it will be remembered that Barrington mentions Sir Ashton's name in connexion with the subject. Montagu, by the way, through an obvious slip of the pen, doubles the asserted capacity of the pouch, and then proceeds to show that its size must have been somewhat exaggerated. On this circumstance an anonymous writer, whom, from his thorough acquaintance with the subject, added to the quiet humour that he displays in its treatment, I imagine to have been the late Mr. Broderip, aptly remarks (*Frazer's Magazine*, No. 297, Sept. 1854, p. 339), that Montagu's strictures "look

very much like making the giants first, and then killing them.” In 1810, Tiedemann (*Zoologie*, ii. p. 398) repeats much that had been previously written on the question; and though he refers to Seeligmann’s account, yet, as he carefully follows Bloch’s accidental errors, his acquaintance with the former author was clearly derived only at second hand: I therefore forbear to quote what he says. In 1814, Sir Everard Home (*Lectures on Comparative Anatomy*, i. pp. 277–8) states that—

“The male bustard, in some particular species which I have examined, has a long bag which hangs down on the anterior part of the œsophagus as low as the middle of the neck, communicating with the mouth by an opening under the tongue, which appears to have a sphincter muscle. This bag was not met with in the young bustard, and is unknown to several very intelligent naturalists in Bengal, where the bustard is common and of several species.”

Now this passage is not marked by that precision one could wish, and, from its similarity to an observation of John Hunter’s, then unpublished, but which, as I shall presently show, was in all probability known to Sir Everard, leaves it open to doubt whether that noted plagiarist ever did examine a male Great Bustard for himself. In 1818, Vieillot (*Nouv. Dict. d’Hist. Nat. &c.* xxiv. p. 286), from the accounts of Perrault and Pallas, already given, compiled a description of the tongue, palate, and pouch of the *Otis tarda*. It contains no new facts, and I need not cite it here.

In the course of the ten years following 1821 appeared the great work of Meckel (*System der vergleichenden Anatomie*), of which, I regret to say, I have only been able to consult a French translation, though it is one which was published in 1838, by Drs. Sanson and Schuster, with the author’s approval. In this (*Traité Général d’Anat. Comp.* viii. p. 236) Meckel is represented as saying:—

“Chez le mâle, on voit descendre de la face inférieure, au-devant de la langue, un sac fort spacieux et à parois minces, qui, placé immédiatement au-dessous de la peau, occupe toute la longueur du cou, et dont la cavité présente, chez les adultes, assez d’ampleur pour contenir deux litres d’eau. Selon MM.

Bloch et Tiedemann [*ut suprà cit.*], ce sac serait propre non-seulement au mâle, mais encore à la femelle. Mais il faut nécessairement, que ces observateurs se soient laissés aller à quelque illusion, puisque j'ai examiné dix sujets femelles, qui ne m'en ont pas présenté le moindre indice. Je dois donc adhérer à l'opinion de MM. Douglas et Home [*ut suprà cit.*], qui avait été déjà hypothétiquement émise par Schneider [*loc. cit.*], et admettre que cet organe ne se rencontre que chez le mâle.

“Quant à l'autre assertion de M. Home, qui établit que le sac en question n'existe pas chez les jeunes sujets, je n'ai pas été en mesure de la vérifier; cependant je ne serais pas loin de penser qu'une jeune femelle ait été prise, par cet auteur, pour un mâle; une semblable méprise, mais en sens inverse, semble avoir induit en erreur M. Tiedemann.”

It is noticeable from this, that neither Meekel nor his translators assert that they ever found the pouch at all; and that such mistakes as they attribute to Home and Tiedemann are possible on a cursory examination, I think, is quite likely. M. de Rochebrune (Trans. de la Soc. Linn. de Bordeaux, iv. p. 167) has remarked, that when the female has come to her full growth, at the age of from three to four years, she exhibits the same lateral plumes from her chin as does the male, but in some degree less developed. The hint thrown out by Sir Everard Home appears to have been taken by ornithologists in India; for, in 1832, Colonel Sykes (Proc. Comm. Sci. & Corr. Zool. Soc. ii. p. 155), speaking of “*Otis nigriceps*”—*Eupodotis edwardsi* of Gray—states that the male is “supplied with the remarkable gular pouch common to the *Otis tarda*.” And to have done with this part of the subject at once, it is better to say here, that some twenty years later, in 1855, Lieutenant Burgess also mentions (P. Z. S. 1855. pp. 32, 33), on the authority of Mr. A. F. Davidson, that the male of the same species, about breeding-time, “is fond of mounting some elevated spot, and then strutting about with the tail erected and spread, the wings drooping, and the pouch in the throat inflated with air and looking like a large bladder.” This writer further adds, in corroboration of the assertion, that another informant had told him that “he had seen a Bustard with a white-looking bag hanging below the neck.” I may

also state, that from Mr. J. H. Gurney I learn that the late Mr. Frederick Strange some years ago published in an Australian journal an account of the large Bustard of that country (*Eupodotis australis*, Gray), in which he asserted that that species was also provided with a gular pouch. I have made various efforts to ascertain the name of the publication—I believe an illustrated newspaper—in which this statement occurs, but hitherto without success, and I shall be greatly obliged to any one who can give me a reference to the communication.

In 1834, J. F. Naumann printed the results of his own observations, and those of Nitzsch, on this subject. The latter is quoted (Naturgesch. der Vögel Deutschl. vii. p. 10) as saying:—

“Die grösste, schon seit langer Zeit bei *O. Tarda* beobachtete, aber meines Wissens bei andern Arten bis jetzt noch nicht bestätigte, anatomische Merkwürdigkeit dieser Gattung ist ein grosser häutiger, unter der Zunge geöffneter Sack, welcher vorn unmittelbar unter der Halshaut vor der Luftröhre liegt, und bis zum Gabelknochen herabsteigt, aber, wohl zu merken, sich bloss beim Männchen findet. (Er fehlte bei den von mir untersuchten Weibchen und Männchen der *Otis Tetraz*.) Der Zweck dieses sonderbaren, bei keinem Vogel ausser der Trappengattung wahrgenommenen, Organs ist noch keineswegs ermittelt.” He then goes on to say that the male of the Great Bustard has another distinctive character, not possessed by the female, namely, a small “Schlundkropf;” but this, however interesting, is foreign to my present purpose.

Naumann himself refers (*tom. cit.* pp. 20, 21) to the pouch in the following terms:—

“Ganz ausserordentlich merkwürdig ist der oben erwähnte häutige Sack oder sogenannte Wasserbeutel, welchen aber nur allein das Männchen hat. Dieser Beutel besteht aus einer dünnen dehnbaren Haut, fängt sich unter der Zunge zwischen den Kinnladen an, läuft vorn zwischen der Halshaut und der Speiseröhre herab, und ist mit dem untern Ende am obern Rande des Brustbeins befestigt. Seine einzige Oeffnung ist unter der Zunge, und sonst nirgends eine zu entdecken. Er hat, wenn er mit Luft oder Wasser angefüllt ist, oft eine einfache, sehr langgezogene Eigestalt; gewöhnlicher noch ist er aber am

Eingänge enge; dann eiförmig erweitert und in der Mitte seiner Länge am weitesten; nachher wieder sehr verengert; dann wieder in Eiform, aber kürzer und nicht so stark wie oben erweitert und wie ein spitzes Ei geschlossen. Bei einem recht alten Männchen ist seine Länge ziemlich 14 Zoll; seine Weite am Eingange $\frac{5}{8}$ Zoll; dann in der Mitte, wo er am weitesten, $2\frac{3}{8}$ Zoll, dann wieder zu $\frac{5}{8}$ Zoll verengert und die untere Blase wieder $1\frac{3}{4}$ Zoll weit; alle diese Maasse im Durchmesser.—Er fasst eine ziemliche Menge Wasser, doch lange keine 8 Pfund, und man vermuthet, wiewol ohne Grund, er sei ein ähnlicher Wasserbehälter wie der des Kameels, um Vorrath trinken zu können; aber warum war er denn dem Weibchen nicht auch gegeben?! Wasser fand ich überhaupt darin nur sehr wenig, nicht einmal einen Esslöffel voll, vielmehr ihn meistens ganz leer, nur ein Mal einige Grassamen, welche zufällig hinein gerathen zu sein schienen. Er scheint mir überhaupt mehr ein Luft- als ein Wasserbehälter zu sein. Sein Zweck bleibt vor der Hand ein Räthsel, wie er dies schon lange war.”

I have cited the above extracts in full, because, as will be seen by-and-by, they are those on which Dr. Gloger chiefly relies. I shall also presently quote Mr. Yarrell's comments upon them. Merely remarking, then, that no new information is to be gathered from Siebold and Stannius (*Lehrbuch der vergleich. Anat.* pp. 296–7), I pass on to an interesting statement, which was published in 1849, by Degland (*Orn. Eur.* ii. p. 73, *note*), and is as follows:—

“Je dois à mon honorable confrère, le docteur Dorin, de Châlons-sur-Marne, la connaissance d'un fait assez curieux et que je ne dois pas omettre. A l'époque des amours, il se développe dans le lieu même où s'insèrent les moustaches, une sorte de fanon, formé par une masse de tissu cellulaire graisseux, lâche, dont le volume est considérable, puisqu'il atteint et dépasse le poids d'un kilogramme. Cette sorte de fanon, qui occupe la partie antérieure et latérale du cou, est formée de deux masses qui se réunissent sur la ligne médiane, à partir de la naissance des barbes jusqu'au bas du collier. C'est au moyen de muscles fauciers assez développés que l'oiseau peut imprimer des mouvements à cette masse, et par conséquent relever ou abaisser les

plumes allongées qui s'y implantent. A la fin de juillet, elle commence à s'affaïsser, les plumes tombent, se renouvellent, si bien qu'avant la fin de septembre il ne reste plus rien de cette grande masse de tissu cellulaire."

In March 1848, Professor Owen made the preparation of the head and neck of a male *Otis tarda*, which is now in the Museum of the Royal College of Surgeons of London, and which, in 1852, he thus described (Cat. Physiol. Series Mus. R. Coll. Surg. 2nd ed. vol. i. p. 233):—"772, Q. The head of a Bustard (*Otis tarda*), with the mouth and fauces exposed, showing the glandular orifices between the rami of the lower jaw, the tongue, glottis, internal nostril, and eustachian orifice. There is no trace of a gular pouch." I may add, that an inspection of this specimen, still exhibited to visitors, shows positively that in it there is no opening under the tongue, and also that the Professor did not conduct his dissection in the manner that has been attributed to him by Dr. Gloger. I now come to the article which has provoked the hostile remarks of that naturalist, and, in justice to Mr. Yarrell's memory, I am obliged to make some copious extracts therefrom, that my readers may decide for themselves whether or not he has been misrepresented. Mr. Yarrell (Trans. Linn. Soc. xxi. pp. 159, 160) says as follows:—

"I had long wished to have an opportunity of examining the body of a male Bustard to inspect the gular pouch described by Daines Barrington in his 'Miscellanies,' 1781, and by Edwards in his 'Gleanings in Natural History,' 1811, and from thence copied by Bewick and myself, but it was not until lately that an opportunity offered. About four years ago the Zoological Society obtained by purchase six or seven young Bustards from Germany. One of these birds, a male, died within a year: the body was examined by Mr. Mitchell and myself, but no gular pouch was found. This we then attributed to the youth of the bird. During the past summer of 1852, one of the males of these birds was frequently observed courting a female. * * *

"In the month of December last this male Bustard, believed to be four years old, unfortunately died, and Mr. Mitchell very kindly allowed me to examine this adult bird.

“To give an indication of what I expected to find, I may first quote the words in Edwards’s ‘Gleanings’ :—[Here follows the extract I have already given from that author, and which therefore I need not repeat.]

“My examination of the mature male Bustard, sent to me from the Zoological Society’s Gardens, was confined to the neck only. I very carefully divided the skin, in a straight line from the union of the two branches of the lower mandible to the edge of the furcular bone or merrythought. On separating the edge of this skin on each side to the right and left, a thin delicate membrane was seen covering and firmly attached to the anterior surface of the trachea or windpipe, which lies close to the inner surface of the common skin. Separating the skin still wider, there was on each side of the trachea an elongated narrow column of membrane investing and attached to the blood-vessels and ordinary glands of the neck, and extended downwards was attached to the lateral branch of the furcula on its own side. The œsophagus inclines to the right side of the neck in its passage downward. There was no opening under the tongue; and I failed in various attempts to distend any part of the membranes below, either by fluid or by air.

“I was disappointed, and began to doubt the accuracy of my own investigation ;” and Mr. Yarrell then proceeds to say, that it was only after turning to the accounts of Perrault and Cuvier, and taking Professor Owen’s opinion—all of which I have before referred to—that he offered his statement to the Linnean Society. When I was in London the following summer, Mr. Yarrell was good enough to show me the preparation he had made, and on my own authority I can declare that in this specimen there was no trace of a gular pouch.

Mr. Yarrell’s paper was read before the Linnean Society, January 18, 1853, and was printed a few months afterwards, I in the meantime having told him of the strong evidence in favour of the contrary opinion which was to be gathered from German authors. When, some two years later, he was preparing the third edition of his ‘British Birds,’ I again wrote to him on the subject, enclosing him translations of the passages from Naumann’s work which I have already quoted; for I was well aware that he

was but slightly acquainted with the German language, as he himself, and with unfeigned regret, was at all times ready to admit. Those who enjoyed his friendship were more disposed to admire the amount of scientific knowledge with which, in the intervals of a laborious life, he had stored his mind, than to wonder at there being some special branches of learning—however important these might be—of which he was ignorant. Mr. Yarrell in writing to me, under date January 11, 1856, says as follows:—

“I have now prepared my article on the Great Bustard for the printer. I have made no reference to the various objections of Naumann and others. The existence of an opening or no opening under the tongue . . . is not a matter of age, since of the two I examined one was a year and a half old, the other four years. The air-bag being of variable shape, in one case with a contraction in the middle, shows that it was not destined to hold water. Gravity would prevent any division. The small quantity of fluid is the seasonal secretion of the glands of the neck and the connecting cellular membranes, and lubricates the surrounding parts. . . . The grass seeds are equivocal; I cannot understand how they were to get there . . . such foreign substances would destroy the bird by inflammation.”

Most of the above passage, it will be seen, has reference to the account given by Naumann of his own experience rather than that of Nitzsch; but in my letter of December 6, 1855 (which by favour of Mr. Van Voorst, Mr. Yarrell's executor, now lies before me, and to which it was in reply), I had especially mentioned the observations of the second-named observer as quoted by the first. But it is quite certain from what I have said that Mr. Yarrell was fully aware of the testimony to the existence of the gular pouch adduced by German naturalists, if not prior to the printing of his paper in the ‘*Linnean Transactions*,’ yet at least before the appearance of the last edition of his well-known work, in which (B. B. 3rd ed. vol. ii. pp. 445–449) his former remarks are inserted almost word for word.

In 1854, Dr. Crisp communicated to the Zoological Society the results of his dissection of three Bustards, one of which—a male, aged about two years and a half—had died in the gardens

from an accidental injury. There is no notice of this paper in the Society's publications, but it will be found entire in Mr. Newman's periodical for that year ('Zoologist,' xii. pp. 4237-9). It is to be remarked that, at the time the communication was written, its author was not aware of the conclusions at which Mr. Yarrell had arrived. Dr. Crisp says:—

“My object in bringing the anatomy of this bird before the Society is in reference to the faucial pouch (so-called), figured in Mr. Yarrell's ‘British Birds,’ 1843, and in Professor Owen's article on “Birds,” ‘Cyclopædia of Anatomy and Physiology.’ . . . On a careful dissection of the male bird, I find a thin membrane covering the whole length of the trachea, attached to the os hyoides above, to the œsophagus and cervical vertebræ behind, and to the clavicles and sternum below; its attachment to the trachea in front is very loose, and a probe can readily be passed between it and the trachea, and probably if air or water were introduced under it, a bag might easily be formed; but it has no connexion with the mouth or pharynx: nor can I conceive that it could be used for the purpose assigned to it; for if filled with water, it would materially interfere with the functions of the trachea and œsophagus. The presence of this membrane may perhaps account for the statement that this male bird is provided with a bag to contain water during the breeding-season. I do not deny the existence of such a bag, but I think its presence, in any case, is very doubtful. . . . In my dissection of the females I did not examine the neck, but it will be very interesting hereafter to ascertain whether the membrane I have described exists in the female Bustards and in other species of birds.”

Dr. Crisp concludes by saying he had also examined Professor Owen's preparation in Surgeons' Hall, “which clearly shows that there is no communication with the pharynx and this supposed gular pouch;” and he has since informed me that he has dissected two or three other cock Bustards, and always with the same result.

Now thinking it quite possible, from my knowledge of the various opinions I have here arrayed, that the belief in this mysterious organ might have been prematurely abandoned, I was very anxious to investigate the matter for myself. I thought it highly

desirable that an examination of a really old cock-bird should be made, and *that* at the season of the year when a structure of the sort might be supposed to be most fully developed. As our native race of Bustards has been extinct since 1838, or thereabouts, it was not easy to obtain such a specimen as I wished*. At length, through the kindness of a correspondent, Mr. Henry Smurthwaite, on the 12th of March, 1858, I received a magnificent old male *Otis tarda*, which had been killed near Leipzig a few days before, and had been forwarded to me with all possible speed. It weighed $23\frac{1}{4}$ lbs., and arrived in beautiful condition. With the greatest anxiety, I immediately looked under the tongue—no hole was visible; I took a probe—no opening appeared. Mistrusting my own powers of manipulation and dissection, I hurried off with it to London and secured the assistance of Mr. A. D. Bartlett, than whom there can scarcely be a more practical or more careful observer. We again searched for the opening under the tongue, and we came, I confess reluctantly, to the undoubted conclusion that in this specimen it did not exist. Mr. Bartlett then began to skin the neck—not in front, lest we should cut into the pouch, but from the axilla along the side to the corner of the mouth, laying bare the skin on either side: nothing like a pouch could be seen. Subsequently we separated the windpipe and gullet, and cut them off from the head. Then with a blowpipe it was easy to inflate the body by the œsophagus: by the trachea we failed to do so, as the air escaped through a broken wing-bone; but by blowing down the former we could swell out the whole body and neck wonderfully. After that, we cleared the skin away from the entire neck, and presently from the body. The neck was entirely clothed with cellular tissues in a most remarkable manner; they were very delicate, and so close to the skin that even when we grazed the roots of the feathers we oc-

* Most, if not all, of the stray examples which have of late years occurred in England appear to have been birds of the preceding summer, and, with two exceptions only, have been females. The very fine young male obtained near Hungerford, January 3, 1856, was preserved at Mr. Leadbeater's establishment (P. Z. S. 1856, p. 1). Mr. J. Wolley, who was then in London, at my request, questioned the man who skinned it, but no special search for a gular pouch was made. The breast-bone of this bird, with some of the membranes still adhering to the anterior part, is now lying before me.

casionally cut them. On the blowpipe being inserted into one of the apertures thus made, a small bubble was immediately raised, which increased on greater power being applied, so as to form a considerable bag, perhaps three inches long. This peculiarity we found in every part of the neck; but it was plain, after one or two trials, that none of these bags existed of themselves, but were the result of the membranes being forcibly ruptured by the pressure of the air. Once or twice, on inflating the tissues, a sort of hour-glass form, such as is mentioned by Naumann, was apparent, but generally the bags were wider at the top than at the bottom. The examination took us between three and four hours, but at last the membranes became so dry that we had some difficulty in inflating a small cluster of bubbles to preserve as a specimen, which Mr. Bartlett still keeps. I can most honestly assert, that if I had any prepossession beyond the wish of arriving at the truth, it was in favour of the existence of the pouch; and I am sure Mr. Bartlett took all possible pains to find it. I had told him of much that had been written and of much that I had heard on the subject; among other things a communication I have not before mentioned here, made to me by my friend Mr. John Scales, to the effect that many years ago, when residing in Norfolk, he obtained a very large male Bustard, now one of the glories of the Museum at Norwich, from which he "dissected out the pouch." Mr. Bartlett, as my readers are no doubt aware, now holds the situation of Superintendent at the Gardens of the Zoological Society, and knowing that he has since had other opportunities of observation, I lately applied to him to furnish me with the results. His answer, containing, as I think, a most valuable suggestion, is as follows:—

"The interest I have felt with reference to the existence or otherwise of the pouch in the throat of the Great Bustard has naturally led me to examine with great care all the birds of that species that have come within my reach. Notwithstanding my want of success, and, I must add, my disappointment, I am of opinion that it would be unwise and unfair to deny that something differing from what I have found does occasionally exist. The fine large adult male obtained by you in March 1858, and in which we failed to find any opening under the

tongue, or any natural pouch, on examination exhibited a structure capable of being easily converted into an appearance of that which is so carefully described by older authors. Since that opportunity, I have dissected two other males; one on February 14th, 1861. Dr. Albert Günther, Dr. Sclater, and Mr. E. W. H. Holdsworth were present on this occasion. The bird was a large male—not an old one, but probably in the second year, the whiskers being somewhat developed. The most careful examination, made by myself and the above-named gentlemen, failed to discover any opening under the tongue. Being perfectly satisfied on this point, an incision was made in the skin, beginning at the corner of the mouth; and, as in the specimen which you and I formerly examined, we found the same abundance of delicate membranes spread over the fore part of the neck and throat. By inserting the end of a blowpipe any number of cells could be inflated, the walls of which on the application of a little force would give way, and thus form one or more large cavities or bags. During the examination, a discussion took place with reference to the means whereby these membranes were distended in life—whether by muscular dilatation or by inflation,—and I must admit that this part of the subject has since appeared to me to require more consideration than I at first thought it deserved. On February 21st, 1861, another fine male Great Bustard, of about the same age as the last, was examined by me, and with precisely the same result as before. In conclusion, the only suggestion I can offer as a means of explaining the existence of a pouch in the fore part of the neck is that, in the males, some of the membranes surrounding the throat may occasionally be ruptured through the excessive distention that takes place during the violent paroxysms to which the birds are subject on the approach of the breeding-season. I have seen them with throats enlarged to an extraordinary extent, the pinions lowered to the ground, while the points of the primaries are crossed over their backs. In this distorted attitude they rush on and attack each other, affording one reason to imagine that these delicate membranes may at such a time give way, and produce the abnormal condition so often alluded to as being found in old males. As a further probability of this being the true explanation, I would

call attention to the great diversity in size and shape of the so-called pouch, as given by different observers. The fluid contained therein would be also fully accounted for, if my hypothesis be correct."

Dr. Günther besides has favoured me with his observations on the dissection of one of these specimens, at which he, as Mr. Bartlett states, was present. Dr. Günther says:—"It was an adult male, as we saw by the plumage and by the testicles. There was no trace of a foramen below the tongue, or of any peculiar sac communicating with the cavity of the mouth. The œsophagus dilated into a large crop. The cellular tissue between the œsophagus and the trachea, and in the region above the furcula, did not show any development greatly differing from what we find in other birds." Dr. Günther, I believe, does not entirely assent to the probability of Mr. Bartlett's ingenious suggestion being the true explanation of the case, but says that "it is possible that an accessory organ, peculiar to the male sex, like this sac, may be found in some males, probably in the larger portion, and in others not. From this single example which I have seen, I should for the present draw the conclusion only that the sac is not constant in all specimens."

It has long been known in this country that at the death of John Hunter, in 1793, his manuscripts passed into the hands of Sir Everard Home, by whom they were burnt, after he had adopted from them many ideas, which he announced as his own, but fortunately not before copies of a considerable number of the papers had been made by Mr. Clift. At the death of this gentleman these copies came into the possession of Professor Owen, who in the course of last year published them. In this work (*Essays and Observations on Natural History*, ii. pp. 300, 301) occurs the following passage:—

"The cock-bustard has a very thick neck and long hairy feathers under his throat. On the fore part of his neck, reaching lower down than the middle, is a large bag, as large as the thick part of one's arm: it terminates in a blind pouch below, but has an opening into it at the upper end from the mouth. This aperture will admit three or four fingers; it is under the tongue, and the *frænum linguæ* seems to enter it; and it seems to have

a sphincter. What the use of this is I don't know. In a young cock-bustard about a year and a half old, this pouch did not exist; therefore it becomes a question whether or not this is a matter of age."

I have now only to refer to Dr. Gloger's paper (*Journ. für Orn.* 1861, pp. 153-5), which has drawn from me this protracted reply. After the various sarcasms which he directs at English naturalists in general, and the three that he names in particular, one would expect that he would put forward some new considerations in his own justification. While he accuses Professor Owen, Mr. Yarrell, and Mr. Mitchell of destroying in the act of their examination the very structure they were looking for, he asserts that they knew so little of the question historically that they had no suspicion of the descriptions furnished by Nitzsch and others—with which I have already proved that Mr. Yarrell was acquainted—and he displays his own carelessness by stating that this gentleman's observations are printed in the publications of the Zoological Society. These charges being made, the original facts adduced by him are contained in the following paragraphs, which I quote in full, that those who have taken the trouble to follow this long story may judge for themselves of their value:—

“Wenn man einen Sack bei einem Thiere anatomisch untersuchen will, so fängt man bekanntlich damit an, dass man die Oeffnung sucht, mit welcher er nach dieser oder jener anderen Höhle od. dergl. ausmündet. Durch diese Oeffnung, welche sich bei der Trappe in der Mundhöhle unter der Zunge befindet, bläst man ihn dann auf, so dass man seine Lage und seinen Umfang deutlich erkennt. Dann kann man ihn leicht, ohne ihn zu verletzen, aus der ihn mitumschliessenden Halshaut, in welcher er wie eingesenkt fest sitzt, herauspräpariren: wie der kürzlich verstorbene Inspector des hiesigen Zoologischen Museums, Hr. Rammelsberg, es mehrfach gethan hat. Getrocknet und mit Firniss gegen Insectenfrass bestrichen, lässt sich ein solches Präparat viele Jahre lang aufbewahren. Jene drei Engländer müssen also die gesammte Untersuchung auf ganz verkehrte Weise ausgeführt haben.

“Allerdings ist der Sack bei alten Männchen auffallender, und mithin noch leichter zu finden, als bei jungen: da er bis zu

einem gewissen Grade mit den Jahren an Grösse zunimmt. Doch fasst er schon bei den jüngsten Hähnen, sobald sie erwachsen oder gar ein Jahr alt geworden sind, ein Viertelquart Flüssigkeit; bei älteren hat Inspector R. ein halbes Quart, ja bei manchen drei Viertelquart Wasser in denselben hineingegossen. Und zwar that er diess absichtlich noch an dem Vogel selbst, bevor er den Sack herauslöste: so dass also von zu weiter Ausdehnung desselben durch Aufblasen oder durch das Gewicht des Wassers nicht die Rede sein konnte. Einmal hatte ich das Vergnügen, der Präparation selbst beizuwohnen. Das Exemplar war gerade ein mehr als gewöhnlich alter, zur Fortpflanzungszeit erlegter Hahn; und sein Hals erschien, wie es dann verhältnissmässig bei allen geschieht, in dem Maasse angeschwollen, dass man ihn schon oben mit beiden Händen kaum zu umspannen vermochte. Unten wären Finger von mehr als gewöhnlicher Länge dazu nöthig gewesen. Die Wamme des fettesten Stieres von der berühmten Kurzhorn-Race hätte, der Haut- und Fleischmasse am Vorderhalse dieses Trapphahnes gegenüber, nur wie ein dünner und lockerer Hautlappen ausgesehen. Nach der Heckezeit verliert sich zwar diese gewaltige Anschwellung; der Kehlsack wird aber natürlich darum nicht kleiner, oder wenigstens nicht kürzer. Er schrumpft nur mit der Haut des Vorderhalses, in welcher er ja eben festsitzt, in gleichem Maasse zusammen, wie diese selbst. Auch bei jungen, kaum erwachsenen Hähnen, wie es der zu London untersuchte war, ist derselbe schon gross genug, dass es für keinen Anatomen ein Entschuldigung giebt, wenn er 'Nichts davon findet.'"

I trust I have said sufficient to show that modern English ornithologists have not made their investigations in the manner attributed to them by the author of the foregoing passage. They have in all cases commenced their researches by looking for the opening said to exist under the tongue. If they have not found it, it is assuredly because there was none such in the examples they examined. That these examples were not all young, undeveloped birds is also clear; but if any further evidence on this point is required, I would refer to the beautiful picture by Mr. Wolf (*Zool. Sketches*, pl. 45), which was drawn from an individual in our Zoological Gardens—an individual

afterwards the subject of one of the examinations here mentioned, though of which is not certain. No one who looks at that picture—representing as it does the male *Otis tarda* in all the pride of lust—can for a moment doubt that the original was a truly adult, mature and fully developed bird.

In composing my reply to Dr. Gloger's article, which I have forwarded for insertion to the same Journal that contains his animadversions, I have chiefly had in view the vindication of Mr. Yarrell and Mr. Mitchell, though, from the nature of the subject, I have been forced to quote the statements which I have here repeated. In England, where those gentlemen were better known, the same necessity does not exist, and hence I can here with propriety sink the capacity of a controversialist, which only a sense of duty compelled me when addressing foreigners to assume, in favour of the more agreeable character of an inquirer after truth. This I do with greater readiness because I wish the questions (1) whether the cock Bustard naturally has or has not a gular pouch, and (2) if it has, at what age or in what way it originates, to be decided on their own merits, apart from those personalities which Dr. Gloger has introduced into the discussion. The questions indeed seem as far from being settled now as ever they were, and I must leave their determination to the ornithologists and anatomists of those lands in which the *Otis tarda* still abounds. We in this country have certainly done our best towards that end, but the difficulty of obtaining a sufficient number of fresh specimens is so great that we may well be excused from further researches. In Germany the case is entirely different; and I hope that my remarks, if they are honoured with a place in the 'Journal für Ornithologie,' may tend to elucidate the truth. I must state my opinion that dried preparations, such as those of the late Herr Rammelsberg, to which Dr. Gloger appeals, afford no certain evidence. As I have shown, we have had them already in England; nay, we have now at least one such, and that from a bird which certainly possessed no true gular pouch! All naturalists will be contented if a really scientific and unbiassed man—such, for example, as Professor Giebel of Halle—will institute new researches and report the results; and he lives in what, if I mistake not, is the very focus of the Great Bustard's German range.

It only remains for me to say that I have tried to compress my remarks into as short a space as I could. I have therefore not only refrained as much as possible from commenting on the different quotations I have given, but I have endeavoured to cite those authors alone whose statements seemed to deserve mention here, whether from the originality of their observations or for similar worthy reasons. It is very probable that I have omitted to name some: in this case I shall be most ready to receive additional information on the subject from any one. But I trust I have already adduced a mass of conflicting testimony sufficient to satisfy an impartial judge that there is much more in this interesting matter than can be set at rest by a few words, unsupported by any really new facts, in the tone which Dr. Gloger has adopted; and, for the honour of natural history and of naturalists, the questions I have above propounded require answers.

Elveden, January 29, 1862.

P.S. February 17, 1862.—Since the foregoing article was written, I have received the fifth part of the '*Journal für Ornithologie*' for 1861, which was published on the 25th January last, and contains (p. 398) a short note from Professor Owen on this subject. The Professor conclusively shows that he has been egregiously misrepresented by Dr. Gloger, but is slightly in error when he states that the French Academicians found a gular pouch to exist in the Great Bustard. No mention is made by them, in the account to which I have referred, of the existence of such an organ in any one of the six male examples which they examined.

XVI.—*Five Weeks in the Peninsula of Florida during the Spring of 1861, with Notes on the Birds observed there.* By GEORGE CAVENDISH TAYLOR, F.R.G.S., F.Z.S., &c. (Part I.)

OWING to political events in America I was compelled to defer my expedition to Florida, last spring, to a much later period than I had originally intended, and the same causes brought it to an abrupt termination. Before leaving Baltimore, I was so fortunate